MORTALITY

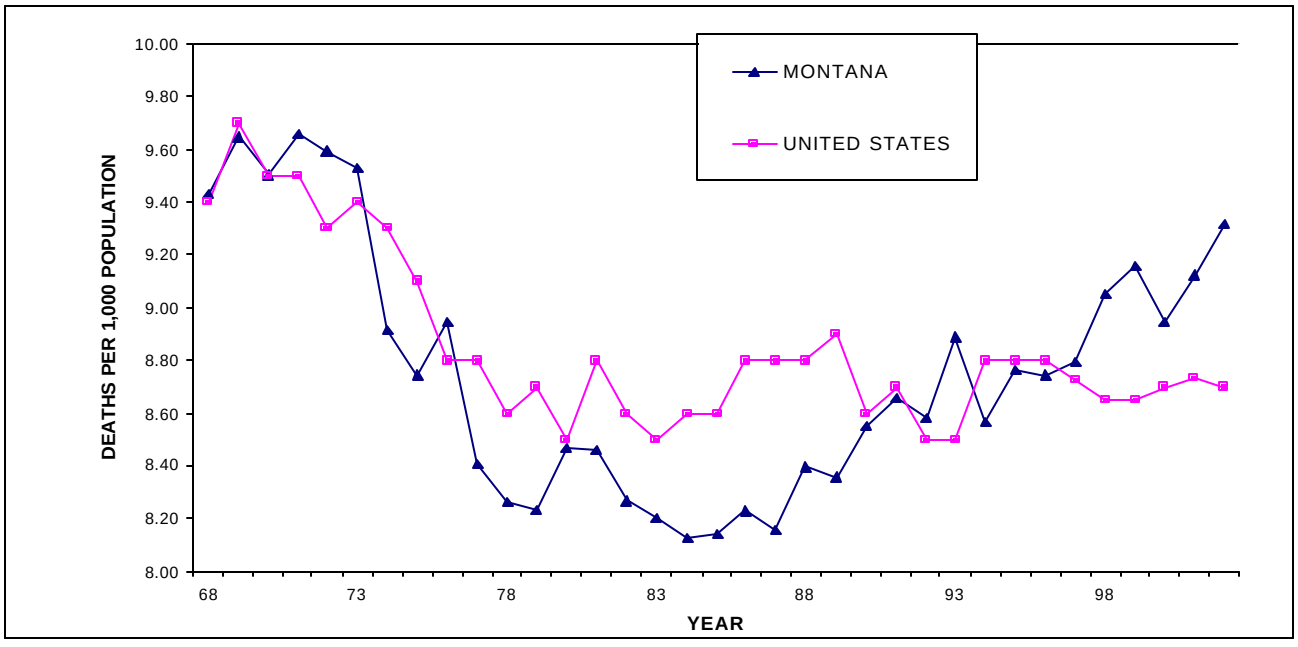
Montana's crude annual resident mortality rate in 2002 was 9.3 per 1,000 estimated midyear population. There were 8,473 Montana residents that died in that year, with their median age being 78 years. Of these people, 4,173 (49.3%) were males and 4,300 (50.7%) were females; this was the first time in ten years that fewer resident Montana males died than females. This relationship was only exhibited in the white race where there were 4,095 white females (48.3% of all deaths) compared to 3908 white males (46.1% of all deaths) among Montana residents for 2002. There were 8,003 white resident decedents (94.5%) and 433 Native Americans (5.1%).

By way of comparison, Montana's population was almost evenly divided between males (49.8%) and females (50.2%). According to the U.S. Census Bureau, 90.6% of Montana's resident population in 2000 was white and 6.2% was Native American. (One and seven-tenths percent of the population reported themselves as being of mixed race.)

Figure 13 shows the crude death rates per 1,000 population for Montana and U.S. residents from 1968 through 2002. Montana's annual rate follows the national trend fairly closely throughout this period. However, there were slight deviations, particularly in the 1980s and late nineties. Montana's rate displayed no consistent trend from 1967 to 1973, averaging about 9.5 deaths per 1,000 population. Montana and The United States dropped precipitously beginning in the early 1970s, and Montana, for the most part, has been rising since the mid-1980s. The increase of Montana's rate from 9.1 in 2001 to 9.3 in 2002 reflects an increase of 2.1% in the number of deaths and an increase of 0.56% in size of the resident population.

Figure 13

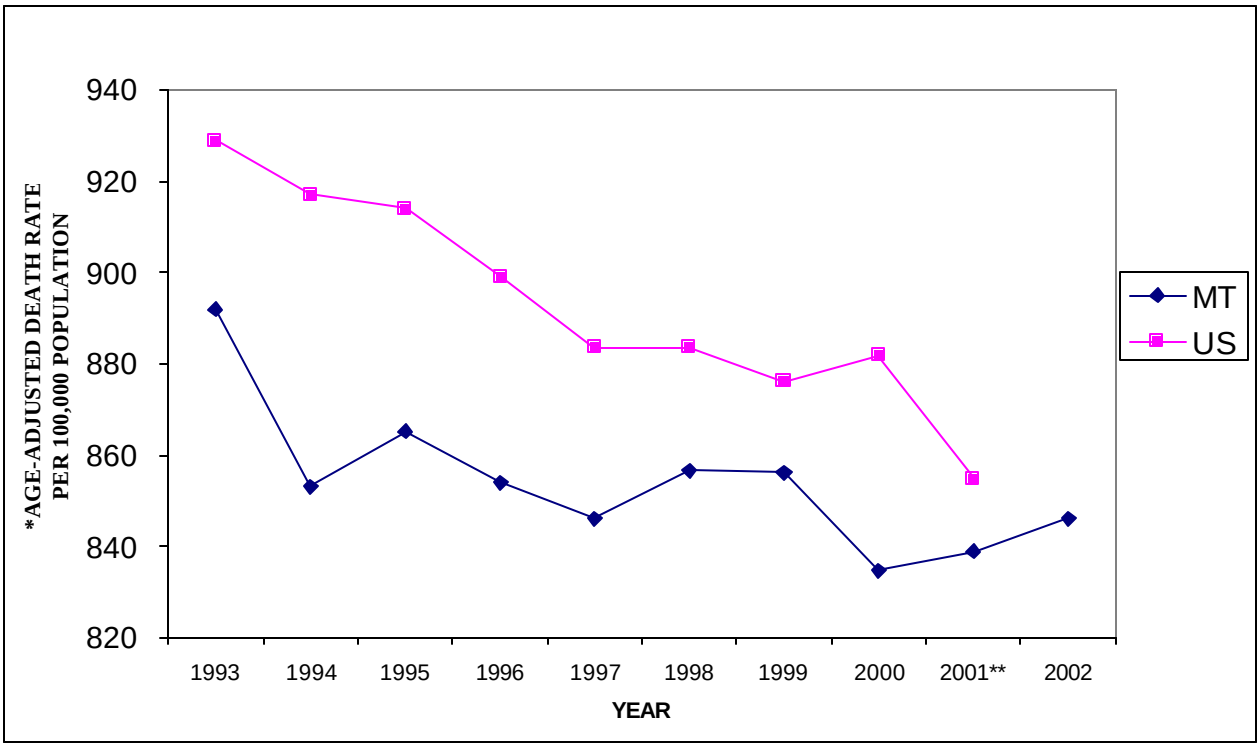
RESIDENT CRUDE DEATH RATES
MONTANA AND THE UNITED STATES, 1968 - 2002



The rate of death is closely related to the age structure of the resident population. It is therefore useful to adjust this rate for differences in the age distributions of populations when comparing death rates between those populations. (See the definition of "age adjusted death rate" in the DEFINITIONS section of this report for a description of the mathematics of age adjustment and also see the section on AGE-SPECIFIC AND AGE -ADJUSTED DEATH RATES below for discussion of their proper use.) While the crude death rate represents the absolute risk of death in a single population at a particular time, the age-adjusted rate offers a better comparison of the relative risk of death between populations in different geographic areas at a single time or in the same geographic area at different times.

Figure 14

AGE-ADJUSTED DEATH RATES*
MONTANA AND UNITED STATES RESIDENTS, 1993- 2002



* Adjusted with the direct method to the year projected 2000 U.S. population.
** The U.S. rate for 2001 is preliminary and the rate for 2002 is not yet available.

Figure 14 shows the age-adjusted death rates for Montana and U.S. citizens for the last 10 years. It is notable that while Montana's crude death rate (reflecting the absolute risk of death among the resident population) has been increasing, the age-adjusted rate (which reflects relative risk by adjusting for the age of the population and the age of its decedents) has been generally declining over the ten years profiled. It is also notable that the age-adjusted rate for Montana was lower than the U.S. rate for eight of the ten years profiled, averaging about 96.2% of the national rate.

Figure 15 summarizes the distribution of age at death for Montana residents by sex and race for the ten-year period, 1993 to 2002.

Figure 15

AGE AT DEATH IN YEARS BY SEX AND RACE
CENTRAL TENDENCY AND DISPERSION*
MONTANA RESIDENTS, 1993 - 2002

RACE AND SEX	NUMBER OF DEATHS	MINIMUM AGE	25TH PERCENTILE	MEDIAN AGE	75TH PERCENTILE	MAXIMUM AGE	MEAN AGE	STANDARD DEVIATION
ALL RACES								
TOTAL	78,650	0	66.0	77.0	85.0	111	72.9	18.6
MALE	40,746	0	62.0	75.0	83.0	109	69.6	19.1
FEMALE	37,903	0	70.0	81.0	88.0	111	76.5	17.3
WHITE								
TOTAL	74,730	0	67.0	78.0	86.0	111	73.8	17.9
MALE	38,514	0	63.0	75.0	83.0	109	70.5	18.4
FEMALE	36,215	0	71.0	81.0	88.0	111	77.2	16.6
NATIVE AMERICAN								
TOTAL	3,619	0	42.0	61.0	75.0	107	56.8	23.4
MALE	2,067	0	37.0	57.0	72.0	107	53.4	23.6
FEMALE	1,552	0	49.0	65.0	78.0	104	61.3	22.3
OTHER								
TOTAL	301	0	45.0	67.0	79.0	101	59.6	26.2
MALE	165	0	38.0	63.0	77.0	101	56.7	25.7
FEMALE	136	0	53.5	70.0	82.0	101	63.0	26.4

*****The *mean* is the arithmetic average, the *median* is the midpoint. To illustrate, one quarter of the decedents died at or under the age at the *25th percentile;* half at or under the age at the *median* (or *50th percentile)* etc. The *standard deviation* measures the concentration of the distribution around its mean.

In the last decade, whites typically died at an older age than Native Americans. The age at death for whites was several years greater than that for Native Americans at every quartile (25^{th} percentile, median, and 75^{th} percentile). Particularly striking was the fact that one quarter of the white decedents died at or below the age of 67, while one quarter of the Native American decedents died at or below the age of 42 years.

There was greater variability in the age at death for the Native American population than for the white population. The standard deviation, which measures the distribution around the mean, was greater for the Native Americans (23.4) compared to whites (17.9); thus, a larger proportion of Native Americans died at younger- or older-than-average ages than did whites.

In general, female decedents were older than male decedents; the mean and median ages at death were greater for women than for men, regardless of race. For white women, the median age was 81 years,

compared to 75 years for white men. The median age for Native American women was 65years, compared to 57 years for Native American men.

Decedents of all "other" races were a much smaller proportion of the Montana total decedents (less than 0.4%) and their age distributions were more similar to the Native American distributions than those of the White Montanans.

FETAL, INFANT, AND MATERNAL DEATHS

Table S-1 shows the frequency and crude rate or ratio of all deaths and of fetal, infant, and maternal deaths occurring in Montana (regardless of place of residence) at five-year intervals from 1910 to 1945 and yearly from 1946 through 2002 for deaths of Montana residents (regardless of place of occurrence).

Figure 16

FIVE-YEAR INFANT MORTALITY RATES AND FETAL MORTALITY RATIOS MONTANA RESIDENTS, 1979 - 2002

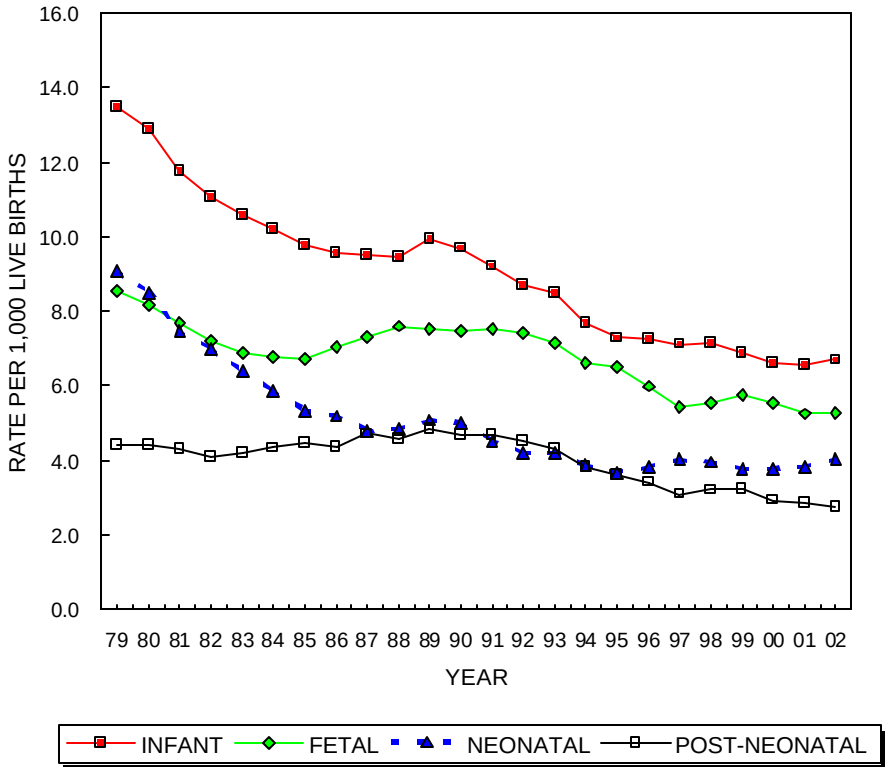


Figure 16 shows the five-year infant and fetal mortality rates for Montana residents from 1979 through 2002. There was a substantial decline in the five-year infant death rate during this period. This rate, the number of infant deaths per 1,000 live births, was nearly halved during this interval. It declined from 13.5 in 1979 to 6.8 in 2002. The five-year death rate for the infants dying in the neonatal period, the first 28

days of life, was more then halved during this period, declining from 9.1 per 1,000 live births in 1979 to 4.0 in 2002. The rate for post-neonatal infants (infants 28 days and older) declined by more than one-third, falling from 4.4 to 2.8 per 1,000 live births. The five-year fetal mortality ratio also declined during this period, falling by more than one-third, from 8.6 deaths per 1,000 live births in 1979 to 5.3 in 2002.

There were 51 resident fetal deaths and 81 resident infant deaths in Montana in 2002. Frequencies of infant and fetal deaths by Montana county of occurrence and residence appear in **Table S-2**. **Table S-3** shows the frequency of fetal deaths by the mother's race and county of residence. The number of infant deaths and five-year infant mortality rates by Montana county of residence appear in **Table D-8**.

Selected causes of death by age and sex for Montana resident infants are shown in **Table D-1** and in **Table D-7**. (See **Figure 2** for a complete listing of all 358 potential causes that could appear in Table D-1. See **Figure 4** for a complete list of the 130 potential causes that could appear in Table D-7.) Sudden infant death syndrome (SIDS) together with congenital malformations, deformations, and chromosomal anomalies caused more than two-fifths of all infant deaths in 2002.

Table F-1 shows the frequency of fetal deaths by race, sex, gestational age, and selected cause of fetal death. (See **Figure 5** for a complete list of the124 potential causes that could appear in Table F-1.) **Table S-4** shows the frequency of fetal, infant and child deaths by county of residence.

AGE-SPECIFIC AND AGE-ADJUSTED DEATH RATES

Most death rates presented in this report are crude rates, unadjusted for demographic factors such as age, sex, or race that will likely affect the risk of mortality. Crude cause-specific rates express the frequency of mortality from a certain underlying cause of death as a proportion of the resident population. They express the risk (average chance) of dying from the specific cause of death cited. They are useful in making comparisons, within a single resident population, of the mortality risks associated with different causes. However, their use for comparisons between populations--the Montana resident population in different years, for instance--is limited. (Because the resident populations of Montana in different years had different age compositions, they are considered to be different populations.)

In the past, the resident population of Montana (and of the nation) was considerably younger than it is now; younger residents represented a smaller percentage of the population in the first years of the 21st Century than they did only a decade before. In such cases, age-adjustment is helpful for a more meaningful comparison of mortality rates.

Age-adjusted death rates should be interpreted as index numbers rather than direct measures of mortality risk. They are useful for making comparisons between populations (where demographic variables such as the overall age of the population may differ), but not for making comparisons within any single population. They are designed to "adjust" for differences in the age compositions of resident populations in different years by applying observed (i.e. actual) age-specific mortality rates to a hypothetical population with an unchanging age composition. By standardizing in this way, age-adjusted death rates help address issues such as whether an increasing or decreasing death rate is due merely to an aging population or whether some other factors are involved.

For instance, one can compare the Montana age-adjusted death rate for heart disease in different years in order to identify any trends in mortality. It is inadvisable, however, to compare the age-adjusted rate for heart disease to that for cancer within any given year, or from one year to another. While it is tempting to be

concerned with the numerical value of the age-adjusted rate, this is also inadvisable because of the sensitivity of the quantitative value to the choice of a standard population.

Figures 17 through 46 display age-adjusted death rates for several of the leading causes of death in Montana and the United States. These rates are age-adjusted with the direct method to the projected U.S. population for the year 2000. As with any summary statistic, age-adjusted death rates mask much of the underlying complexity in the mortality experience of the population. Hence, Montana's age-specific death rates are also shown for each cause of death displayed.

Because of the small number of deaths in certain age categories, many of the age-specific rates (e.g. those for chronic liver disease and cirrhosis, motor vehicle accidents, and suicide) may be statistically unstable or present somewhat confusing patterns. However, for several causes of death, such rates present a clear pattern and add useful information about the burden of particular causes of death among the age groups. Age-specific rates for all causes of death are represented here so the reader can judge their usefulness for him or herself.

When analyzing trends in cause-specific age-adjusted death rates, one should remember that the change from one revision of ICD to another (from the ICD-9 to ICD-10 in this case) can dramatically affect the apparent rates for some underlying cause of death, since different revisions (and subsequent changes in rules of classification and selection) can result in different underlying causes for a death record. Underlying causes of death were determined using the conventions of ICD-9 in the years prior to 1999 and the conventions of ICD-10 thereafter. This change is marked in the following graphs with a vertical bar.